# PATENT SPECIFICATION

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**244,498**

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## COMPLETE SPECIFICATION.

## Improvements in the Control of Switches or the like.

I, Archibald Montgomery Low, Captain in His Majesty's Army, of Royal Air Force Experimental Works, Feltham, in the County of Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the control of switches or the like and is of particular utility in the case of the control of torpedoes, aeroplanes or other devices where it is specially desirable that the control should be of such a character that it will not be liable to interference by hostile or outside influences.

The invention consists in control apparatus for switches or the like which is rendered operative when two members are moving at synchronous speeds.

The invention also consists in control apparatus for switches or the like in which any particular switch is selected or is rendered operative when a member in association with the switches is vibrated at a definite speed.

The invention further comprises the forms of apparatus hereinafter described.

The accompanying drawings illustrate two modes of carrying out the invention.

Figure 1 is a more or less diagrammatic view showing one form of control apparatus in accordance with the invention.

Figure 2 is a similar view showing a modified form of apparatus.

Figure 3 shows a further modified form of apparatus.

Figures 4 and 5 are views illustrating a still further modification, and

Figure 6 is a developed view on a smaller scale of Figure 4.

In carrying my invention into effect in one convenient manner as, for example, in its application to the selective control of switches provided, for example, in conjunction with torpedoes for regulating the rudder control and in which it is very desirable that the control should not be subject to hostile interference I provide in conjunction with each switch that is to be selected a microphone relay *a* which may be of any usual or desired form and which is located between two open-ended tubes *b* - *b*¹ which, for convenience, are substantially Y shaped in order to provide for the symmetrical location of the relay.

In association with the tube *b* I arrange a tuning fork *c* which is adapted to be actuated at a definite known speed of vibration by electrical means, any suitable form of circuit being provided to produce the necessary vibratory current. For example, I may provide a transformer comprising a primary coil *d* and secondary *e*, the latter being in series with the electro magnet *f* and having condensers *g* in circuit, while a spark gap *h* is arranged as a shunt across the secondary.

It will be understood, however, that this arrangement is given by way of example only as any desired means may be adopted for imparting a definite known rate of vibration to the tuning fork *c*.

A similar tuning fork $c^1$ is provided in conjunction with the tube $b^1$ and this is adapted to be operated by suitable wireless means, the arrangement being such that the microphone relay $a$ (and therefore the particular switch in conjunction therewith) will operate only when the speed of vibration of the tuning fork $c^1$ is equal to the speed of the fork $c$, the latter speed being known only to those whose business it is to control the switches.

It will be understood that a similar arrangement of apparatus will be provided in conjunction with each switch or other control, and the tuning forks $c$ in connection with the various controls may all be vibrated at the one speed, or, if desired, they may vibrate at different speeds so that a different speed of operation for the respective wirelessly controlled tuning forks will be required for operating each of the various controls.

The microphone relay may be provided with a sound grid or filter or otherwise suitably arranged so that it will respond only or chiefly to the periodicity of the tuning fork $c$ and for no other period.

Figure 2 illustrates a modified form of apparatus in which the various control keys or contacts are indicated by $a^1$, $a^2$, $a^3$ and $a^4$, and in association with these keys or control contacts I provide a wire $i$ stretched string or other like vibratory member if necessary tensioned by weight or by a tensioning spring $k$.

The wire or the like is adapted to be vibrated by means of a buzzer or like electrically vibrated member $l$, the arrangement being such that with adjustable and variable control of the speed of the buzzer the wire or like vibrating member may be made to assume varying forms of curve or curves of varying amplitude so that for any particular speed of buzzer one control only will be operated, and unless the particular speed is known for each control the control cannot in any way be effected.

The buzzer may be adapted to operate only when control is to be effected, or it may be kept continuously buzzing and in this case the sending waves must be of a definite known nature in order to produce the effects necessary to bring about the respective controls.

It will be understood that the foregoing details are given by way of example only as the invention in its broad conception is capable of being carried into effect in a variety of ways without departing from the spirit and scope of the invention and the construction and arrangement of the different parts may be suitably modified depending upon the purpose to which the invention is to be applied or any particular practical requirements that may have to be fulfilled.

A further modification of the invention is shown in Figure 3 and consists of two perforated discs $m$ $n$, tapes or other members which may be arranged to rotate or move otherwise in relation to a body of mercury $o$ so that, for example, contact will only be obtained and the relay $p$ operate when the movements of the two members synchronise, there being one member moving at a definite known speed for each switch or the like to be controlled and a corresponding member adapted to be moved synchronously therewith. A pump $q$ may be used to return the mercury.

In a still further modification shown in Figures 4 to 6 each switch or the like may be adapted to be controlled from a contact plate $r$ or other member having a definite number of contacts $s$ so arranged that the particular control circuit corresponding to any particular contact plate will only be completed when contact is made by plungers $t$ with each of the contacts on the contact plate.

The plungers or the like may be carried upon a drum or other rotary member $u$ which is driven at a known regular speed controlled if necessary by a tuning fork or other arrangement, and the plungers or fingers are adapted to be moved into contact with the contact plates by a tapper or pusher $v$ which is arranged to be operated wirelessly in any suitable manner and which enables the springs $w$ to actuate the plungers.

The manner of consecutive plungers or fingers which are pushed into position for contacting with the contact plates will depend upon the speed or duration of operation of the pusher or tapper in relation to the definite known speed of rotation of the drum, and the particular control effected may therefore be selected by a proper adjustment of the wireless operation of the pusher or tapper.

An inclined or other cam surface $x$ or other device may be provided for returning the plungers or fingers to their inoperative position in which they are held by the spring-controlled members $z$.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Control apparatus for switches or the like adapted to be rendered operative when two members are moving at synchronous speeds.

2. Control apparatus for switches or the like in which any particular switch is selected or rendered operative when a member in association with the switches is vibrated at a definite speed.

3. Control apparatus for switches or the like comprising contact places having

varying numbers of contacts thereon, a rotary member adjacent to such plates carrying movable fingers or plungers and rotated at a definite regular speed and wirelessly operated or controlled means for moving the fingers or plungers into contact with the contacts on the contact plate.

4. Improved control apparatus for switches or the like, substantially as hereinbefore described and as illustrated by the accompanying drawings.

Dated this 18th day of July, 1918.

MARKS & CLERK.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1926.

[This Drawing is a reproduction of the Original on a reduced scale]

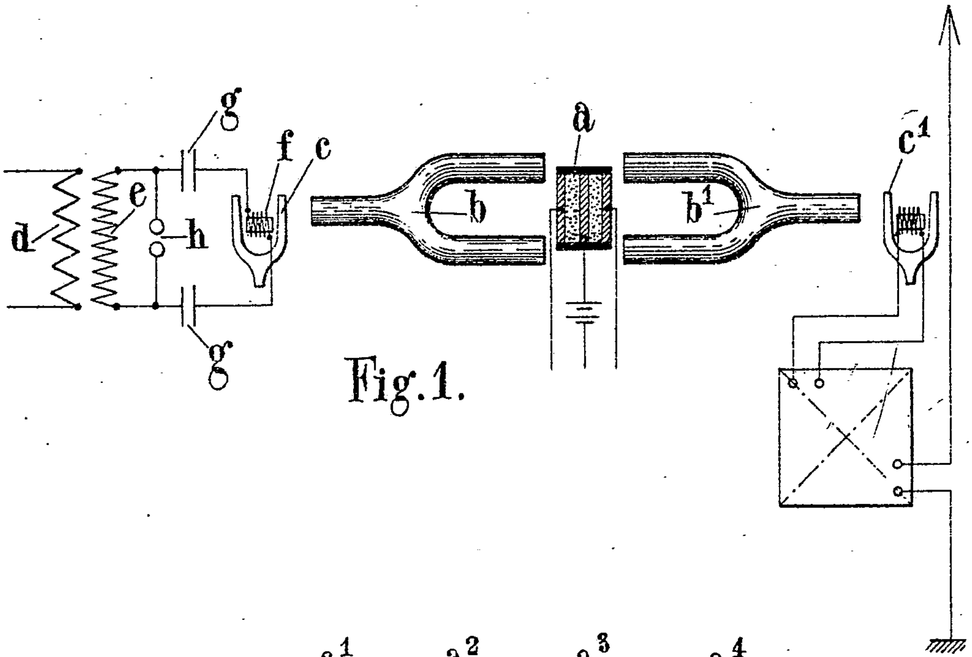


Fig.1.

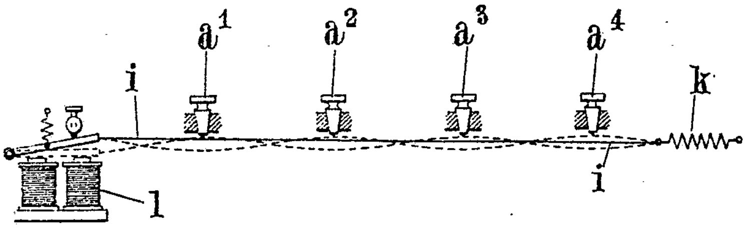
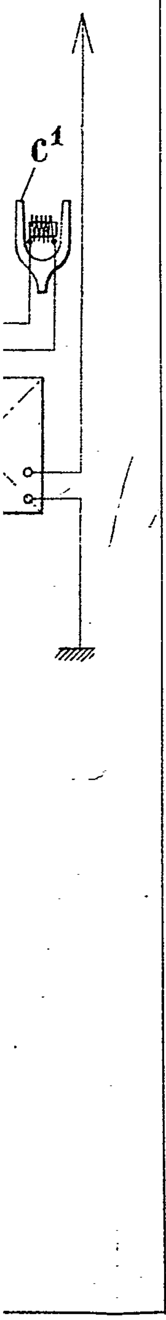


Fig.2.



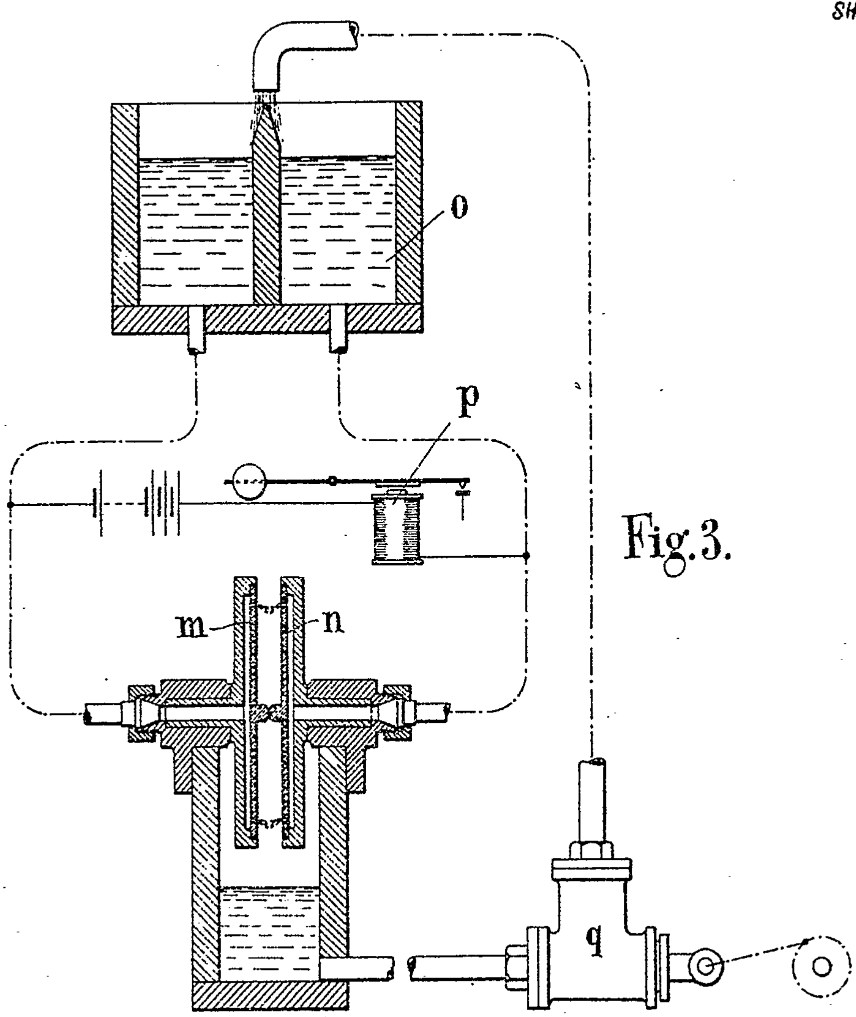


Fig.3.

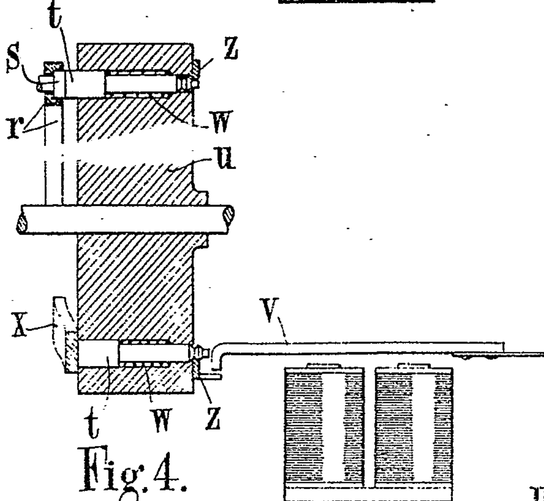


Fig.4.

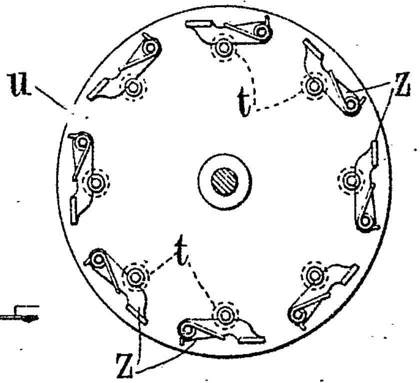


Fig.5.

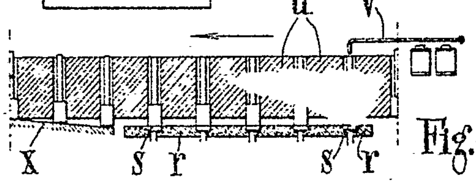


Fig.6.

[This Drawing is a reproduction of the Original on a reduced scale]

SHEET 1

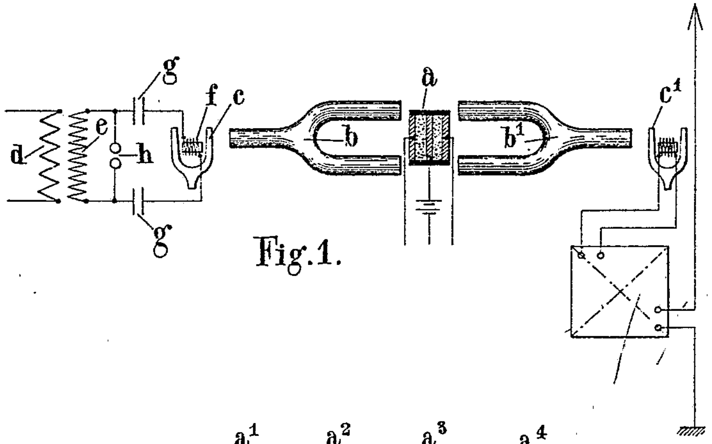


Fig.1.

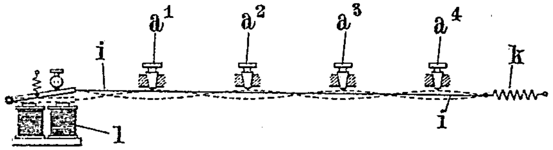


Fig.2.

SHEET 2

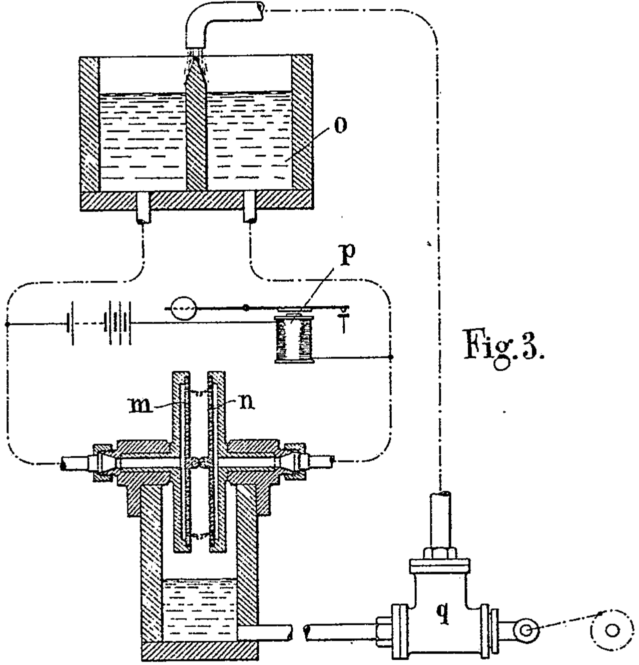


Fig.3.

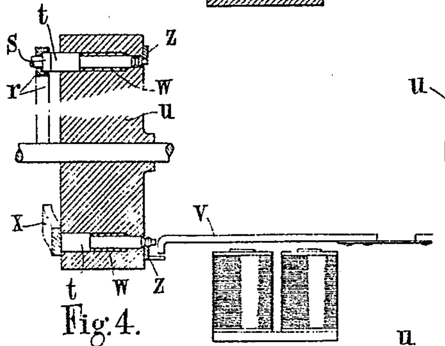
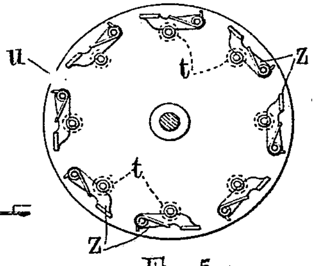


Fig.4.



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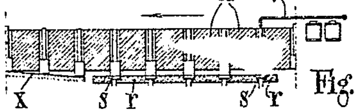

Fig.6.

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